Closed Captioning Matters: Examining the Value of Closed Captions for *All* Students

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Abstract

As the number of online course offerings expands and student retention and graduation metrics proliferate, colleges and universities are examining how to maximize student comprehension, meet the needs of a diverse student body, comply with accessibility regulations, and avoid litigation. One area of particular interest is the use of closed captioning in online course materials. The University of South Florida St. Petersburg Distance Learning Accessibility Committee and faculty contributors conducted an initial investigation to determine the benefits of providing captioned media for students with and without disabilities. Reported here are student outcome data from two online courses and the benefits of captioning for students and faculty are explored. In addition, this practice brief includes a discussion about how captioned videos employ principles of universal design to make course content accessible to students in online courses. A section of the article addresses the cost of captioning videos as well as alternate transcription options. The article concludes with the results and recommendations for further research.

Keywords: *Online learning, web accessibility, closed captioning*

At many institutions, closed captioning in online courses is provided on an as-needed basis. Typically, captions are provided in response to an accommodation request made through an office of student disability services (OSDS). However, recent litigation (e.g., Grasgreen, 2013; Lewin, 2015), growing student diversity in higher education, and potential benefits to all learners highlight the value of making closed captioning a standard feature in online courses.

Federal legislation ensures equal access to higher education for students with disabilities. In particular, Title II of the American with Disabilities Act ([ADA], 1990) requires that communications with people with disabilities is as effective as communications with others. As interpreted by the U.S. Department of Education Office of Civil Rights ([OCR], 2003), "as effective as" encompasses timeliness, accuracy, and the provision of the content in a manner and medium appropriate to the significance of the message and the abilities of the individual with the disability.

In response to a compliance review by the OCR, the Distance Education Accessibility Guidelines Task Force of the California Community Colleges developed an updated set of distance learning guidelines. One of the 11 guidelines outlined the requirement for closed or open captioning for all course media (Distance Education Accessibility Guidelines Task Force, January 2011). A 2012 settlement between the National Federation for the Blind (NFB) and Pennsylvania State University highlighted the importance of accessibility compliance and resulted in the institution improving the accessibility of their distance learning technologies (The Pennsylvania State University, 2011). The OCR has also indicated "The courts have held that a public

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entity violates its obligations under the ADA when it only responds on an ad-hoc basis to individual requests for accommodation" (Distance Education Accessibility Guidelines Task Force, 2011, p. 9). Furthermore, the U.S. Department of Justice (DOJ), which enforces the ADA, took the position that the ADA applies to online communication. In a letter to Senator Tom Harkin of Iowa, the DOJ stated:

> Covered entities under the ADA are required to provide effective communication regardless of whether they generally communicate through print media, audio media, or computerized media such as the Internet. Covered entities that use the Internet for communications regarding their programs, goods, or services must be prepared to offer those communications through accessible means as well. (Patrick, 1996, p. 1)

This further emphasizes the need for comprehensive captioning policies and procedures in advance of accommodation requests and, we believe, demonstrates the value of a proactive approach to accessibility in online course offerings.

Previous research shows that closed captioning can benefit many kinds of learners. In addition to students with hearing impairments, captions stand to benefit visual learners, non-native English learners, and students who happen to be in loud or otherwise distracting environments. In remedial reading classes, closed captioning improved students' vocabulary, reading comprehension, word analysis skills, and motivation to learn (Goldman & Goldman, 1988). The performance of foreign language learners increased when captioning was provided (Winke, Gass, & Sydorenko, 2010). Following exams, these learners indicated that captions lead to increased attention, improved language processing, the reinforcement of previous knowledge, and deeper understanding of the language. For low-performing students in science classrooms, technology-enhanced videos with closed captioning contributed to post-treatment scores that were similar to higher-performing students (Marino, Coyne, & Dunn, 2010). The current findings support previous research and highlight the suitability for closed captioned content for students with and without disabilities.

Making closed captioning standard in online courses with audio or video content is consistent with the principles of universal design. Universal design stipulates that products, spaces, and experiences should be designed to maximize accessibility. Instead of providing alternatives for certain populations, universal design involves inherent accessibility, with the potential to benefit everyone (deMaine, 2014). In the context of higher education, universal design for learning (UDL) provides guidelines for designing instruction that promotes access to and understanding of content for all learners (King-Sears et al., 2015). Central to UDL is the principle that multiple ways to interact with content and people are provided (Tobin, 2014).

Because more students are enrolling in online courses, the potential for UDL principles to enhance higher education is increasing (Rao & Tanners, 2011). Law schools are seeing an increase in the number of students with physical and cognitive impairments (deMaine, 2014), and, across disciplines, students with disabilities participate in online courses at disproportionately high rates (Coy, Marino, & Serianni, 2014).

Some research has tested the effectiveness of UDL in online courses. In a small-scale study, Rao and Tanners (2011) found that students were receptive to course elements developed in accordance with UDL principles. In another study, King-Sears et al. (2015) found no significant differences between a group exposed to a course and a control group. Some research has emphasized the role of captioning as part of a broader UDL strategy. For courses with extensive video resources, Tobin (2014) observed that captions have the potential to benefit almost every student. Other work has focused on the merits of a two-pronged approached to captioning that involves verbatim captions and "concise captions" that are designed to simplify vocabulary and grammar (Sapp, 2009). These studies are preliminary, and more research will broaden our understanding of how the application of UDL principles affects online learners.

Although further empirical evidence is needed, UDL has great promise for increasing access and understanding in online courses. Some evidence also suggests that UDL can improve retention rates online (Tobin, 2014). However, multiple barriers can hinder the successful adoption of UDL principles. UDL can require a significant investment of time (Rao & Tanners, 2011), and the success of a UDL-inspired course ultimately rests on the abilities and attitudes of the instructor responsible for its delivery (Black, Weinberg, & Brodwin, 2014).

Depiction of the Problem

Our institution's Distance Learning Accessibility Committee and contributors conducted an initial investigation to explore the benefits of closed captioning of multimedia for students in two online courses. This project was conducted to determine whether a more proactive approach to accessibility in online courses

at the University of South Florida St. Petersburg was prudent; however, the project results may prove useful to other institutions examining similar aspects of their online instructional strategy. Our guiding questions included the following: Is there a statistically significant difference in student achievement between the captioned and non-captioned course? Was there a significant change in the academic assessment of instruction? What, if any, were the benefits of closed captioned media to students? What is the average per course cost of captioning? Finally, is it more cost effective to caption videos at the institution, rather than with an external vendor?

Participant Demographics and Institutions Partners/Resources

The University offers undergraduate and graduate degrees in arts and sciences, business, and education. The current student population is approximately 6,500 full and part-time students, with significant growth in recent years. Approximately 25% of student-earned credit hours during the fall and spring semesters are generated through online courses. During the summer, approximately 54% of student-earned credit hours are generated online. The university's online courses are delivered using the Canvas learning management system by Instructure.

Description of Practice

All video content was closed captioned for two online courses, which had previously been offered with identical content and format but without captions. This allowed for comparison of the outcome data, student response survey, and student assessment of instruction from both the total of 241 students enrolled in the captioned course as well as the 334 students previously enrolled in the course prior to captioning.

Law & Business I and *Introduction to Psychology* were the courses examined and both courses incorporated the full-length lecture capture method. This method captures a typical full-length lecture in which students will see both the instructor and the presentation visuals (e.g., PowerPoint) on screen. Based on a 16-week semester, the average weekly video lecture length was 99 minutes for *Law & Business I* and 108 minutes for *Introduction to Psychology.* Lectures for both courses were filmed in the Distance Learning Studio at the institution during a regular semester in front of a live audience.

A third-party vendor transcribed the course videos and supplied the captioning files that were attached to videos in post-production. Next, captioning files were packaged with the video using the Camtasia video editing program. Video files were hosted on a server and links to the videos were provided on the course site. These links opened video content in a new tab played within the browser.

At the end of the semester, students were asked to complete an anonymous survey about their experiences. The survey, of which 66 students responded, consisted of 12 questions as well as queries for demographic information, previous experience with closed captioning and online learning, and perceived advantages or disadvantages of their experience with captioning in the current course (See Appendix A).

The survey data, student assessment of instruction, and achievement data were compared with the 334 students enrolled in the previous versions of the course with no closed captions.

Evaluation of Observed Outcomes

Student Benefit

We suspected students would, in general, benefit from the inclusion of closed captioning, and the results support that hypothesis. Interestingly, more than 13% of respondents indicated having a disability, of which only 6% of those indicated being registered with the OSDS. When queried regarding whether captions were helpful, 99% of students reported they were helpful (5% slightly, 10% moderately, 35% very, 49% extremely). We were unable to determine differences among students with and without disabilities, as we did not track individual survey responses.

Qualitative responses to the student survey point to four distinct benefits:

Clarification. Students reported difficulty hearing the instructor at times for various reasons, and captions allowed them to understand the lectures fully, even when the audio was not discernable. This was seen in student comments such as, "Close caption helped me because I was able to read and process what was being said a little easier." This was further evident in comments such as, "The closed caption helped when viewing [sic] the videos at home, because I have small children and at times they can be loud. The closed caption allowed me to read when I could not hear what was being said" and "Helped me because it's not my first language. It was extremely helpful and I took tons of notes."

Comprehension. Some students found the option to both hear and see content more consistent with their learning styles. These self-described "visual learners" treated captions as a core delivery method, not just a

supplement to the audio content. One student remarked, "They clarified any misunderstandings or miscommunications. Made the information easier to learn because I am more of a visual learner."

Spelling of keywords. Students appreciated the chance to see how unfamiliar words were spelled. For example, "If the professor said a word I didn't understand I'd go back and read the caption, there were many legal terms that I did not know of and the captions helped me learn how to spell them."

Note-taking. More generally, students reported using captions as a note-taking tool. For example, one student reported, "They helped because when I was taking notes I was able to pause the video and use the captions rather than rewind and repeat the video." Research (e.g., Locke, 1977; Nye, Crooks, Powley & Tripp, 1984) has shown that taking more comprehensive, accurate notes is correlated with better student academic outcomes. Other research suggests novice learners who take notes while watching video-based lectures remember more and demonstrate better understanding (Shrager & Mayer, 1989). Overall, captions made it easier for students to focus on the instruction and study more efficiently.

Captioning could also enhance academic achievement. The spring 2013 class of *Law & Business I* (with closed captioning) had a slightly higher grade average than the fall 2012 class (without closed captioning). In *Introduction to Psychology,* the class average for the spring 2013 class (with captions) was 7.18% higher than the summer 2012 class (without closed captioning). While a causal link between closed captioning and academic performance is unsubstantiated, these findings certainly merit consideration and eventual empirical examination.

Faculty Benefit

With regard to the impact of closed captioning on instruction, one of the instructors stated:

> I was thrilled to be able to offer the on/off captioning option to my students. I really liked that the students could turn off the captioning option if they found it distracting. I have had several students tell me that they like the closed-captioning feature.

When comparing student assessment of faculty instruction results for both courses across semesters, some differences were observed; however, these differences cannot be considered statistically significant due to the response rate for the surveys, nor can differences be directly attributed to the use of captions. Based on comments from the student surveys, four items could, arguably, be impacted by the use of captions. These are: *Respect and Concern for the Students, Facilitation of Learning, Communication of Ideas and Information, and Overall Rating of the Instructor.*

In *Introduction to Psychology*, there was a modest increase in the *Overall Rating of Instructor, Facilitation of Learning, and Respect and Concern for the Students,* however there was a slight decrease in the *Communication of Ideas and Information. The Law & Business I* instructor indicated modest increases on all four survey items. A table displaying the full results of student ratings of the faculty is provided as Appendix B.

Cost Analysis

Through the selected vendor, the fee was $150 per hour for transcription and provision of caption and transcript files in a variety of formats compatible with many video production programs. Upon reviewing other vendors offering similar services, this was found to be a competitive rate. The cost to caption all videos for both courses for this project was $8,529.93.

Other captioning options also exist. For example, speech-to-text software automatically transcribes speech to text and can be very accurate if speakers spend short sessions training the program to recognize their voices. Faculty could train a dictation program such as Dragon Naturally Speaking and wear a microphone during the presentation to capture and transcribe audio as they teach. This transcript could then be proofread, converted to a time-stamped caption file, and packaged with the video. This process, although time consuming, requires intermediate level technology skills and could be completed by faculty, student employees, or other course development staff. The video production software Camtasia also has speech-to-text capabilities. This program can transcribe and time-stamp captions simultaneously during post-production. The captions would then need to be proofread. Again, this process could prove to be time consuming, and also requires intermediate level technology skills and could be completed by faculty, student employees, or other course development staff. Institutions might also consider hiring a full-time captionist. If an institutional budget permitted, the university could hire a person with a certification in stenography and a minimum of intermediate technology skills to transcribe, proofread, caption and package all multimedia.

Other Takeaways

With a 99% accuracy rating, and low cost of captioning when purchased in high volumes, the selected vendor was determined to be the best supplier at the

time for the purpose of the current project. However, some students reported concerns about the quality of the captions. Accuracy issues and missing spaces between words were observed, and these errors were a potential distraction, possibly limiting the value of the captions. If an institution experienced similar issues, we recommend following up with the vendor to discuss errors and solutions, in addition to researching other video delivery technologies. Having a plan to correct problems with captions when they are detected is also important.

Questions asked by the students in the recorded class periods sometimes produced unintelligible audio, which the vendor was unable to transcribe. Our solution was to install new microphones to better capture audience questions and comments. Ultimately, creating a procedure and making students aware of where and how to report problems with captions is also advisable.

Implications and Portability

Though not conclusive, the results of the pilot investigation provide strong support for further research into the benefits closed captioning can offer to all college students taking online courses. Further research in this area could include evaluating the effectiveness of captions in other courses or content areas, directly analyzing student learning outcomes in captioned courses, evaluating the functionality of a variety of multimedia delivery tools, and comparing data of students with and without disabilities. Given the high stakes when captions are neglected and the potentially significant benefits when they are included, we recommend ongoing research into the merits of this basic but important accommodation.

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Appendix A

Closed Captioning Survey Questions

1. How often did you use closed captioning with the video lessons throughout the semester?
Never | Seldom | Sometimes | Often | Always

2. How helpful were the closed captions?
NA (Didn't Use) | Not at all | Slightly | Moderately | Very | Extremely

3. How distracting were the closed captions?
NA (Didn't Use) | Not at all | Slightly | Moderately | Very | Extremely

4. If the closed captions helped, please explain, briefly, how. If they hindered, please explain why:

5. How helpful was it for the course to have video lectures?
Not at all | Slightly | Moderately | Very | Extremely

6. What is your anticipated grade?
A | B | C | D | F

7. Aside from this course, how many online or hybrid classes have you taken?
None | 1-2 | 3-4 | 5-6 | 7+

8. Outside of this course, describe your experiences with closed captioning in an academic setting:

9. Do you ever struggle with focusing or maintaining attention in class?
Never | Seldom | Sometimes | Often | Always

10. Do you have a disability?
YES| NO

11. If so, what is your disability type? (checkboxes, multiple answer)
Chronic Medical Disorder | Learning Disability | Sensory Disability | Physical Disability | Mental Illness | Intellectual Disability | Developmental Disability | No Answer

12. Are you registered with Student Disability Services?
YES|NO

Appendix B

Student Assessment of Instruction
Summary of Data: All Sections of Both Courses Compiled

Item	Mean (no captions)	Mean (with captions)	Difference
Introduction to Psychology			
Description of Course Objectives & Assignments	4.38	4.42	+ .04
Communication of Ideas and Information	4.58	4.48	-.1
Expression of Expectations for Performance	4.42	4.43	+.01
Availability to Assist Students In or Out of Class	4.04	4.24	+.2
Respect and Concern for the Students	4.15	4.49	+.34
Stimulation of Interest in the Course	4.5	4.43	-.07
Facilitation of Learning	4.23	4.43	+.2
Overall Rating of the Instructor	4.42	4.57	+.15
Law and Business I			
Description of Course Objectives & Assignments	4.59	4.78	+.19
Communication of Ideas and Information	4.59	4.62	+.03
Expression of Expectations for Performance	4.65	4.8	+.15
Availability to Assist Students In or Out of Class	4.52	4.76	+.24
Respect and Concern for the Students	4.6	4.81	+.21
Stimulation of Interest in the Course	4.38	4.56	+.18
Facilitation of Learning	4.46	4.76	+.3
Overall Rating of the Instructor	4.61	4.82	+.21